Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the Editor

Water scarcity and COVID-19 in sub-Saharan Africa

Dear Editor,

Lv et al. recently predicted that many countries could face similar COVID-19 situation as experienced in Hubei in China.[1] Several factors may impact their prediction.

Current evidence suggest that the COVID-19 virus is transmitted via respiratory droplets or contact.[2] Contact transmission happens when contaminated hands touch the mouth, nose, or eyes. Consequently, hand hygiene (regular hand washing) is extremely recommended to control the spread of COVID-19 virus.[2] In this paper, we highlight the issues that characterize water services amid the COVID-19 pandemic in sub-Saharan Africa (SSA) and discuss avenues for improving water management during this pandemic and future infectious disease outbreaks.

In response to the promotion of hand hygiene by the World Health Organization (WHO) and national public health agencies as a means to curbing the spread of COVID-19, Water Service Providers (WSP) in most developed countries have outlined drastic measures with the goal of ensuring continuous provision of essential water and sewerage services to all during this pandemic. For example, in the US and Australia, WSP have suspended water shutoff with service to be temporarily restored to thousands of households disconnected.[3,4]

Access to water is a key determinant for infectious disease control and prevention; thus, limited access creates a challenge for transmission control.[5] Nevertheless, across many SSA countries where inequalities in access to safe water is pervasive,[6] there is a need to be worried in light of COVID-19 pandemic. Nearly 300 million people in SSA live in water stressed environment (Table 1).[5]. This presents a major challenge towards controlling the spread of COVID-19 s. Indeed, poorly developed water and sanitation systems was reported to be a key determinant of the rapid spread of the 2014 Ebola outbreak, as well as an underlying factor in the high number of deaths.[7] So how do the recommended precautionary measures relative to COVID-19 fit within the everyday practices in SSA countries characterised by overwhelming water scarcity?

As of 5 May 2020 (13:00 GMT), only Lesotho remains a COVID-19-free country in SSA (Supplementary Figure S1). In response to the increasing threat from COVID-19, most SSA countries have instituted a lockdown (partial in most places). However, residents are concerned about a potential increased spread of COVID-19 due to water rationing. In Ghana (www.youtube.com/watch?v=Kl5V8A8ToYg) and Kenya (www.bbc.com/news/world-51929598) for example, many households struggle to comply with the advice to 'frequently wash hands under running water' because of the water rationing. It is worth noting that social distancing is almost impossible as residents are likely to queue to access or buy water. Notably, one of the key public health preventive messages for COVID-19 is: 'washing hands with soap and water for 20 seconds, repeatedly throughout the day, is critical to prevent transmission of the virus'.[8] In many SSA settings, this is an unimaginable luxury due to the inequalities that characterize the provision of water services as well as the limited opportunity to wash hands regularly at home. Consequently, in this period, it is important to reflect on the water and sanitation services situation in the SSA region. In particular, the ongoing COVID-19 pandemic provides an opportunity to remind water authorities and the respective governments of the importance of improving water access for the vulnerable populations. To achieve this, good water governance and adequate investments are critical. Initiatives like the Water and Sanitation for the Urban Poor (WSUP) (www.wsup.com) and the WaterAid's Low Income Customer Support Units (washmatters.wateraid.org) in countries like Malawi, Uganda, Zambia, and Kenya should be implemented as long-term measures geared towards upscale, resilience and sustainability of water services. Interventions should include strengthening policy, institutional and regulatory frameworks. In response to COVID-19, policy measures that consider a more 'inclusive and holistic water security' are needed.

With the water demand pressures from rapid population growth and urban expansion in SSA, there is urgent need to increase the efficiency of use by implementing strategies for improving the conservation of available water. Green or nature-based solutions can help to improve water storage and supply, thus increasing water availability. This is particularly needed today considering expectations that water shortage will worsen in SSA due to climate change and risk of droughts causing the decline of water levels of dam and freshwater supply sources.[9,10]. Water scarcity and security issues will be exacerbated by recent trends of climate variability and consequent rise in droughts. Thus, climate resilient

Table 1
Trends in water stress and scarcity in selected SSA countries (2000–2019).

Country	Proportion of population in water stress and scarce areas (%)					
	2000		2010		2019	
	Stress	Scarce	Stress	Scarce	Stress	Scarce
Ghana	14.1	2.6	12.2	9.5	13.5	4.5
Nigeria	13.2	6.2	17.5	9.3	19.7	9.5
South Africa	8.2	9.5	8.8	9.2	7.4	13.1
Botswana	9.9	18.9	9.8	24.5	9.2	27.5
Kenya	7.4	13.8	14.5	14.1	19.0	20.9
Ethiopia	13.8	6.5	14.0	9.8	18.5	13.3
Rwanda	21.8	15.4	18.9	37.8	20.2	17.6

Source: World Data Lab (https://worldwater.io/about.php; *Accessed on 25th April 2020).*
Notes: Population living in water scarcity (i.e. with less than 1000m^3 per capita per year) and stress (i.e. with less than 1,500m^3 per capita per year) in selected SSA countries. Water scarcity reflects the lack of sufficient available water resources to meet demand of usage within a region whereas water stress refers to the inability to meet human and ecological demand for water.

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water resource management will require an integrated strategy to ensure resilience for water-related policy making to address both short- and long-term impacts of climate change by balancing robustness with flexibility. With future uncertainties and the likelihood of other potential infectious disease outbreaks, there is the need for robust adaptation options that have the primary objective of supporting sustainable water resources use.

Ensuring affordable access to safe water, sanitation and hygiene (WASH) services is important to address the current COVID-19 and future pandemics. In particular, improved access to WASH facilities could help minimize COVID-19 transmission, and reduce healthcare and other societal costs. For example, the government of Ghana is currently spending money to use water tanks to provide water for poor communities severely hit by the pandemic. Residents in these communities are unable to socially distance or conform to lockdowns for reasons such as the need to get out to access water and toilets. In response, long-term efforts should focus on addressing WASH access issues among the poor communities especially in urban areas. Most people living in informal settlements as is the case for many SSA cities rely on communal water stands and toilets. High cost coupled with limited access could stop generous use of water for hand washing. Leaving homes to use communal services and queuing for access also makes social distancing difficult to implement.

The poor access to water in SSA presents a major barrier to effective containment of the COVI-19 outbreak. It is essential that this unfolding moment trigger collaborative efforts between all stakeholders in rethinking and acting for improved water services during this pandemic and future infectious disease outbreaks.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jinf.2020.05.032.

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Desmond Ofosu Anim*
Cooperative Research Centre for Water Sensitive Cities, Monash University, Clayton, VIC, Australia

Richard Ofori-Asenso
Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, VIC, Australia
Department of Pharmacy, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark

*Corresponding author.
E-mail address: desmond.anim@monash.edu (D.O. Anim)